Taylor Larrechea CQ: 8

Dr. Middleton PHYS 132 HW P: 30, 33, 34

4-6-17 Ch. 33

Problems

33.P.30 $\mathcal{E} = \left| \frac{d\Phi}{dt} \right|$

$N = 100$

$d = 2.0 \times 10^{-2}\ m$

$B_0 = 0.50\ T$

$B_1 = 1.50\ T$

$\Delta t = 0.60\ s$

$\theta = 60^\circ$

$d\Phi = A \frac{dB}{dt} \cos\theta = \pi (1.0 \times 10^{-2}\ m)^2 (1.667\ T/s) \cos(60) = 2.62 \times 10^{-4}\ Wb/s$

$A = \pi (1.0 \times 10^{-2}\ m)^2$

$\frac{dB}{dt} = \frac{1.50\ T - 0.50\ T}{0.60\ s} = 1.667\ T/s$

$100 (2.62 \times 10^{-4}\ V) = 2.62 \times 10^{-2}\ V$

26 mV

$\frac{1}{\frac{3}{5}} = \frac{5}{3}$

30.P.33

dim = 0.1m x 0.1m

$\vec{B} = (0.30t\hat{i}, 0.50t^2\hat{k})T$

$\mathcal{E} = \left|\frac{d\Phi}{dt}\right|$

(a) at t = 0.5s

(b) at t = 1.0s

a.) $\mathcal{E}(0.5s)$ $\quad \Phi = BA\cos\theta$

$d\Phi = \frac{dB}{dt} A\cos\theta$

$A = l^2 = 0.1m^2 = 0.01m^2$

$\frac{d\vec{B}}{dt} = \langle 0.30, 1.0t \rangle$

$\frac{d\vec{B}}{dt}(0.5s) = \langle 0.30, 0.50 \rangle$

$\frac{dB}{dt} = 0.583\ T/s$

$\frac{d\Phi}{dt}(0.5s) = (0.01m^2)(0.58T/s) = 5.83 \times 10^{-3}\ wb/s$

$\mathcal{E}(0.5s) = 5.83 \times 10^{-3} V$

$\mathcal{E}_{0.5} = 5.83 \times 10^{-3} V$

$\mathcal{E}_{1.0} = 1.04 \times 10^{-2} V$

b.) $\mathcal{E}(1.0s)$ $\quad \Phi = BA\cos\theta$

$\frac{d\Phi}{dt} = \frac{dB}{dt} A\cos\theta$

$\frac{d\Phi}{dt} = (1.044\ wb/s)(0.01m^2)\cos(0)$

$A = 0.01m^2$

$\frac{d\Phi}{dt} = 1.04 \times 10^{-2}\ wb/s$

$\frac{d\vec{B}}{dt} = \langle 0.30, 1.0t \rangle$ $\quad \frac{d\vec{B}}{dt}(1.0s) = \langle 0.30, 1.0 \rangle$

$\theta = 0^\circ$ $\quad \frac{dB}{dt} = 1.044\ wb/s$ $\quad \mathcal{E}(1.0s) = 1.04 \times 10^{-2} V$

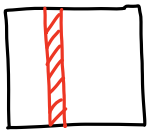
33.P.34

$d_{im} = 0.2m \times 0.2m$

$R = 0.50\Omega$

$B = 0.80y^2t\,\hat{k}$, $t = 0.50s$?

$\mathcal{E} = \left|\frac{d\Phi}{dt}\right|$ $\Phi = \int B \cdot dA$ $\mathcal{E} = \left|\frac{d\Phi}{dt}\right|$



$dA = dy(0.2m)$

$$\Phi = \int B \cdot dA = \int_0^{0.2} 0.80 \cdot 0.20 y^2 t\, dy$$

$$= \int_0^{0.2} 0.16 y^2 t\, dy$$

$$\left(0.16 \cdot \frac{y^3}{3}\right)t \Big|_0^{0.2}$$

$$(4.267 \times 10^{-4})t$$

$4.267 \times 10^{-4}(0.50s) = 2.13 \times 10^{-4}\,wb$

$$d\Phi/dt = \frac{2.13 \times 10^{-4}\,wb}{0.5s} = 4.27 \times 10^{-4}\,wb/s$$

$\mathcal{E} = IR$: $IR = \frac{d\Phi}{dt}$

$I = \frac{1}{R}(d\Phi/dt)$

$I = 2(4.27 \times 10^{-4}\,wb/s)$

$I = 8.53 \times 10^{-4}\,A$

$I = 85\,mA$

Conceptual

33.CQ.8

a.) The current must flow CW to counteract the increasing flux.

b.) No change, no current

c.) The current would flow CCW to counteract the decreasing flux.